

REMARKS

Preliminary matters

Applicants thank the Examiner for the courtesy extended in holding the telephone Interview held on October 15, 2009.

Amendment summary

Claim 1 is amended to further clarify that the inorganic light emitting layer is in direct contact with both electrodes. Support for this amendment may be found, e.g., at least in Figs. 1 and 2 of the present specification.

Applicants note that this amendment merely reflects already-present claim features and presents no new issues for searching.

No new matter is added by this Amendment, and Applicants respectfully request entry of the Amendment.

Response to rejections based on Bulovic

Claims 1, 4, and 6-11 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Bulovic et al. (U.S. Patent Application Publication No. 2004/0023010) (hereinafter “Bulovic”). Claims 2-3 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Bulovic in view of Danek et al. (“Electrospray Organometallic Vapor Deposition - A Novel Technique for Preparation of Quantum Dot Composites”) (hereinafter “Danek”). In addition, claims 5 and 7 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Bulovic in view of Mensz (U.S. Patent No. 5,422,902). Claim 10 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Bulovic in view of

Hayashi et al. (U.S. Patent Application Publication No. 2002/0167280) (hereinafter “Hayashi”). Finally, claim 11 has been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Bulovic in view of Koyama et al. (U.S. Patent Application Publication No. 2003/0094897) (hereinafter “Koyama”).

Applicants respectfully traverse on the grounds that (1) Bulovic does not disclose or suggest the presently recited inorganic light emitting layer; (2) Bulovic does not disclose or suggest the presently recited ambipolar inorganic semiconductor material and nanocrystals constituting a quantum dot dispersed as luminescent centers in the ambipolar inorganic semiconductor material; and (3) none of the cited references discloses or suggests the presently recited inorganic light emitting layer disposed so as to be in direct contact with both the electrodes. There is also no reason provided for why the teachings of Bulovic would have been altered as of the filing date of the present application by a person having ordinary skill in the art to arrive at the presently claimed invention.

Independent claim 1 recites a quantum dot-dispersed light emitting device comprising a substrate, an electron injection electrode, a hole injection electrode, and an inorganic light emitting layer disposed so as to be in direct contact with both the electrodes. The inorganic light emitting layer includes an ambipolar inorganic semiconductor material and nanocrystals constituting a quantum dot dispersed as luminescent centers in the ambipolar inorganic semiconductor material, and is configured without having, at the interface with the electron injection electrode and/or the hole injection electrode, epitaxial relation therewith. The present specification describes at Paragraph Nos. [0015] and [0078] the advantage of using an ambipolar inorganic semiconductor material - it may act simultaneously as a hole transporting layer and an electron transporting layer.

Applicants first traverse on the ground that Bulovic does not disclose or suggest the presently recited inorganic light emitting layer. Paragraph [0048] of Bulovic discloses an emissive (EML) layer. In particular, this paragraph in Bulovic describes that the EML is a layer in which nanocrystals are dispersed in a matrix composed of N,N'-diphenyl-N,N'-bis(3-methylphenyl)-(1,1'-biphenyl)-4,4'-diamine (TPD), which is organic. In other words, Bulovic discloses an emissive layer which comprises inorganic nanocrystals in an organic material (TPD), rather than the inorganic light emitting layer recited in the present claims.

Applicants also note that it appears that the Office Action has improperly characterized an aspect of Bulovic, and that Bulovic does not disclose or suggest the presently recited ambipolar inorganic semiconductor material and nanocrystals constituting a quantum dot dispersed as luminescent centers in the ambipolar inorganic semiconductor material. Specifically, it appears that the inorganic material listed in Paragraph No. [0039] in Bulovic has been equated to the presently recited inorganic semiconductor material of Claim 1. However, the material in Paragraph No. [0039] is actually the overcoat for a surface of a core - the "shell" that is present in Fig. 3 of Bulovic. The overcoat is a component of the disclosed nanocrystals, and is not equivalent to a matrix in which the nanocrystals are dispersed. Indeed, as discussed above, Bulovic describes such a matrix as being the organic TPD, also discussed above. Thus, contrary to the Office Action's assertion, this passage in Bulovic fails to disclose or suggest the presently recited ambipolar inorganic semiconductor material and nanocrystals constituting a quantum dot dispersed as luminescent centers in the ambipolar inorganic semiconductor material.

Applicants further traverse on the basis that none of the cited references disclose or suggest an inorganic light emitting layer disposed so as to be in contact with both the electrodes. The Office Action cites Figures 1-9 in Bulovic as allegedly disclosing this element of the present

claims. However, there is no figure in Bulovic which discloses the inorganic light emitting layer in contact with both of the electrodes. Instead, any inorganic light emitting layer that may be present in the figures in Bulovic contacts adjacent layers, such as hole transporting or electron transporting layers, but does not contact both electrodes. Accordingly, this element of the claims is missing from Bulovic, contrary to the position set forth in the Office Action.

In addition to the above three arguments, Applicants respectfully submit that there is no reason provided by the Office Action for why a person having ordinary skill in the art would alter the teachings in Bulovic so as to provide for an inorganic light emitting layer in contact with both electrodes. Thus, there has not been a proper showing that a person having ordinary skill in the art reviewing Bulovic would alter its teachings to arrive at the presently claimed invention.

Applicants note that the other cited references do not remedy the above deficiencies in Bulovic.

Because (1) Bulovic does not disclose or suggest the presently recited inorganic light emitting layer; (2) Bulovic does not disclose or suggest the presently recited ambipolar inorganic semiconductor material and nanocrystals constituting a quantum dot dispersed as luminescent centers in the ambipolar inorganic semiconductor material; and (3) none of the cited references discloses or suggests the presently recited inorganic light emitting layer disposed so as to be in direct contact with both the electrodes, Applicants respectfully submit that the presently claimed invention is not rendered obvious by the cited references, especially in view of the fact that there is no reason provided for why the teachings of Bulovic would have been altered to arrive at the presently claimed invention.

Applicants respectfully request the reconsideration and withdrawal of the above rejections.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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Date: February 18, 2010

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